

## Summary of Proposed Amendments to the 2015 Seattle Energy Code

Jonlin 3/2/2016 (summary does not include editorial corrections and clarifications) **DRAFT**

**The most significant issues are shown in bold text. See revised code language for each item on subsequent pages.** Nearly all of these proposals were significantly modified from the original proposals during the public meeting and review process.

1. Table C303.1.5 New default U-factor table for spandrel panels.
2. C402.1.3 New exception for shaft walls in parking garage
3. **C402.5.1.2 Tighter standard for air barrier testing**
4. C402.5.7 New vestibule exception for doors to outdoor seating areas.
5. C403.2.4.1 Rewording of incomprehensible exception
6. C403.2.4.13 New requirement - PICVs at large heating and cooling coils
7. C403.6 Clarification that DOAS rule does not impact accessory occupancies
8. C404.8 Prohibition of a sub-standard circulating hot water system type
9. C405.2.5 Modified stairwell light reduction control requirement.
10. **Table C405.4.2 Lighting power allowances.** Reduces all interior LPAs by an additional 10% effective beginning January 1 2018.
11. C405.10 Controlled receptacles. Requires either split receptacles (top half controlled) or controlled outlets placed within 12" of non-controlled outlets (instead of 72").
12. C406.5 Clarifies interaction of C406 solar requirement with C411 solar requirement.
13. **C407.2.1 Requires higher levels of efficiency for buildings with large glazing areas.**
14. C408.3 Clarification that commissioning of controlled receptacles is required.
15. C409.4.3 Metering energy display – new language to clarify characteristics of display format.
16. C411.1 Renewable energy – clarification of calculation methodology for exception
17. **C412 Solar readiness – extends requirement to 20 stories** (rather than 5 stories) and includes multi-family over 3 stories.
18. C503.2 change in space conditioning –exception for adding cooling to spaces less than 2000 SF
19. C503.2– new exception for adding cooling to small spaces
- 19A. C503.4 – Rewording of economizer exception
20. **C503.8.3.2 Substantial alterations envelope UxA path**, limited to 15% above code (not 20%)
21. C503.8.3.2 New disproportionality rule for substantial alterations projects – caps required envelope improvements at 20% of the substantial alterations project building valuation.
22. **C503.8.3.3 Substantial alt's Total Building Performance**, limited to 10% above code (not 15%)
23. Clarification of metering requirements for additions to small buildings
24. Metering of large replacement equipment in existing buildings

## 1. Section C303.1.5 & Table C303.1.5 New default U-factor table for spandrel panels

(Note: Table taken from CA code, with additional clarifications from local experts. Helps to resolve uncertainty about the actual heat transfer through spandrel assemblies.)

**C303.1.5 Spandrel panels in glass curtain walls.** Table C303.1.5 provides default U-factors for the spandrel section of glass and other curtain wall systems. Design factors that affect performance are the type of framing, the type of spandrel panel and the R-value of insulation. Four framing conditions are considered in the table. The first is the common case where standard aluminum mullions are used. Standard mullions provide a thermal bridge through the insulation, reducing its effectiveness. The second case is for metal framing members that have a thermal break. A thermal break frame uses a urethane or other non-metallic element to separate the metal exposed to outside conditions from the metal that is exposed to interior conditions. The third case is for structural glazing or systems where there is no exposed mullion on the interior. The fourth case is for the condition where there is no framing or the insulation is continuous and uninterrupted by framing. The columns in the table can be used for any specified level of insulation between framing members installed in framed curtain walls or spandrel panels.

**C303.1.5.1 Window wall application.** Where “window wall” or similar assembly that is discontinuous at intermediate slab edges is used, the slab edge U-value shall be as listed in Appendix Table A103.3.7.1(3) or as determined using an approved calculation.

**C303.1.5.2 Table value assumptions.** In addition to the spandrel panel assembly, the construction assembly U-factors assume an air gap between the spandrel panel and one layer of 5/8-inch gypsum board that provides the interior finish. The gypsum board is assumed to span between the window sill and a channel at the floor. For assemblies that differ from these assumptions, custom U-factors can be calculated to account for any amount of continuous insulation or for unusual construction assemblies using Equations 1, 2 or 3 where appropriate. Spandrel panel U-factors for assemblies other than those covered by this table or Equations 1-3 may be determined using an alternate approved methodology. Equations 1-3 do not calculate the value of any insulation inboard of the curtain wall assembly.

### Aluminum without thermal break (Equation 1)

$$U_{Overall} = \frac{1}{\left[ (R_{Gypsum} + R_{AirGap}) + \frac{1}{\left( 0.2798 + 0.8929 \times \left( \frac{1}{R_{AddedInsulation}} \right) + U_{CenterofGlass} \right)} \right]}$$

### Aluminum with thermal break (Equation 2)

$$U_{Overall} = \frac{1}{\left[ (R_{Gypsum} + R_{AirGap}) + \frac{1}{\left( 0.1808 + 0.8874 \times \left( \frac{1}{R_{AddedInsulation}} \right) + U_{CenterofGlass} \right)} \right]}$$


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### Structural glazing (Equation 3)

$$U_{Overall} = \frac{1}{\left[ (R_{Gypsum} + R_{AirGap}) + \frac{1}{\left( 0.1151 + 0.9487 \times \left( \frac{1}{R_{AddedInsulation}} \right) + U_{CenterofGlass} \right)} \right]}$$


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**Table C303.1.5 – U-factors for Spandrel Panels and Glass Curtain Walls**

			Rated R-value of Insulation between Framing Members							
			<u>None</u>	<u>R-4</u>	<u>R-7</u>	<u>R-10</u>	<u>R-15</u>	<u>R-20</u>	<u>R-25</u>	<u>R-30</u>
<u>Frame Type</u>	<u>Spandrel Panel</u>		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>
<u>Aluminum without Thermal Break</u>	<u>Single glass pane, stone, or metal panel</u>	<u>1</u>	<u>0.360</u>	<u>0.242</u>	<u>0.222</u>	<u>0.212</u>	<u>0.203</u>	<u>0.198</u>	<u>0.195</u>	<u>0.193</u>
	<u>Double glass with no low-e coatings</u>	<u>2</u>	<u>0.297</u>	<u>0.233</u>	<u>0.218</u>	<u>0.209</u>	<u>0.202</u>	<u>0.197</u>	<u>0.194</u>	<u>0.192</u>
	<u>Triple or low-e glass</u>	<u>3</u>	<u>0.267</u>	<u>0.226</u>	<u>0.214</u>	<u>0.207</u>	<u>0.200</u>	<u>0.196</u>	<u>0.194</u>	<u>0.192</u>
<u>Aluminum with Thermal Break</u>	<u>Single glass pane, stone, or metal panel</u>	<u>4</u>	<u>0.350</u>	<u>0.211</u>	<u>0.186</u>	<u>0.173</u>	<u>0.162</u>	<u>0.155</u>	<u>0.151</u>	<u>0.149</u>
	<u>Double glass with no low-e coatings</u>	<u>5</u>	<u>0.278</u>	<u>0.200</u>	<u>0.180</u>	<u>0.170</u>	<u>0.160</u>	<u>0.154</u>	<u>0.151</u>	<u>0.148</u>
	<u>Triple or low-e glass</u>	<u>6</u>	<u>0.241</u>	<u>0.191</u>	<u>0.176</u>	<u>0.167</u>	<u>0.159</u>	<u>0.153</u>	<u>0.150</u>	<u>0.148</u>
<u>Structural Glazing</u>	<u>Single glass pane, stone, or metal panel</u>	<u>7</u>	<u>0.354</u>	<u>0.195</u>	<u>0.163</u>	<u>0.147</u>	<u>0.132</u>	<u>0.123</u>	<u>0.118</u>	<u>0.114</u>
	<u>Double glass with no low-e coatings</u>	<u>8</u>	<u>0.274</u>	<u>0.180</u>	<u>0.156</u>	<u>0.142</u>	<u>0.129</u>	<u>0.122</u>	<u>0.117</u>	<u>0.114</u>
	<u>Triple or low-e glass</u>	<u>9</u>	<u>0.231</u>	<u>0.169</u>	<u>0.150</u>	<u>0.138</u>	<u>0.127</u>	<u>0.121</u>	<u>0.116</u>	<u>0.113</u>
<u>No framing, or Insulation is Continuous</u>	<u>Single glass pane, stone, or metal panel</u>	<u>10</u>	<u>0.360</u>	<u>0.148</u>	<u>0.102</u>	<u>0.078</u>	<u>0.056</u>	<u>0.044</u>	<u>0.036</u>	<u>0.031</u>
	<u>Double glass with no low-e coatings</u>	<u>11</u>	<u>0.297</u>	<u>0.136</u>	<u>0.097</u>	<u>0.075</u>	<u>0.054</u>	<u>0.043</u>	<u>0.035</u>	<u>0.030</u>
	<u>Triple or low-e glass</u>	<u>12</u>	<u>0.267</u>	<u>0.129</u>	<u>0.093</u>	<u>0.073</u>	<u>0.053</u>	<u>0.042</u>	<u>0.035</u>	<u>0.030</u>

## 2. C402.1.3 New exception for shaft walls in parking garage.

(Note: This exception recognizes that it doesn't make sense to apply the same requirements to stair and elevator shafts within parking garages. Temperatures within the garage are more moderate both winter and summer, and the shafts are not directly heated like other occupied spaces. The exception is not allowed if the shafts are directly heated or cooled, or if the shaft wall area is included in the total "above-grade wall area" for glazing calculations.)

**C402.1.3 Insulation component R-value method.** *Building thermal envelope* opaque assemblies shall meet the requirements of Section C402.2 and C402.4 based on the climate zone specified in Chapter 3. For opaque portions of the *building thermal envelope* intended to comply on an insulation component *R-value* basis, the *R-values* for insulation in framing areas, where required, and for continuous insulation, where required, shall not be less than that specified in Table C402.1.3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R-values* from the "Group R" column of Table C402.1.3. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R-values* from the "All other" column of Table C402.1.3. The thermal resistance or *R-value* of the insulating material installed in, or continuously on, below grade exterior walls of the building envelope required in accordance with Table C402.1.3 shall extend to the lowest floor of the conditioned space enclosed by the below grade wall. Doors having less than 50 percent opaque glass area shall be considered opaque doors. Opaque swinging doors shall comply with the Table C402.1.4 and opaque nonswinging doors shall comply with Table C402.1.3 or C402.1.4.

**Exception.** For stair and elevator shafts located within enclosed garages or other enclosed non-conditioned spaces and without conditioned supply air or heating or cooling appliances other than piping heat trace, metal-framed walls enclosing the shafts are permitted to be insulated with R-15 insulation in the stud cavities, and without continuous insulation, or to have a U-value lower than 0.120. Additionally, slab floors, intermediate mass floor edges and elevator pits within shafts utilizing this exception are excluded from envelope insulation requirements. Surfaces utilizing this exception shall not be included in the gross exterior wall area for purposes of maximum fenestration area calculations in Section C402.4.1, component performance calculations in Section C402.1.5, or for total building performance calculation of Section C407.

### 3. C402.5.1.2 Tighter standard for air barrier testing.

(Note: This change was suggested and refined by public meeting participants. The air barrier testing standard tightens up from 0.40 cfm/sf of surface area to 0.30 cfm. This is closer to the long-standing US Army Corps of Engineers standard of 0.25 cfm. Engineers present suggested that the most significant impact is that a building with an air barrier this tight definitively does not require positive pressurization from the mechanical system.)

**C402.5.1.2 Building test.** The completed building shall be tested and the air leakage rate of the *building envelope* shall not exceed ~~((0.40))~~ **0.30** cfm/ft<sup>2</sup> at a pressure differential of 0.3 inches water gauge (2.0 L/s × m<sup>2</sup> at 75 Pa) at the upper 95 percent confidence interval in accordance with ASTM E 779 or an equivalent method approved by the code official. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the building owner and the Code Official. If the tested rate exceeds that defined here, a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal air leaks shall be submitted to the building owner and the Code Official and any further requirement to meet the leakage air rate will be waived.

(Note: This change is to the C406 “additional efficiency credit” section, and slightly tightens up the leakage standard for this credit. The most significant impact of selecting this credit is that it’s mandatory to actually pass the test (just like it currently is for residential construction), whereas the main C402 code section allows us to issue a C of O even if the building does not pass the test. The exception from the IECC is stricken, as Seattle requires the entire building envelope to be tested.)

**C406.9 Reduced air infiltration.** Air infiltration shall be verified by whole building pressurization testing conducted in accordance with ASTM E779 or ASTM E1827 by an independent third party. The measured air leakage rate of the *building envelope* shall not exceed **0.25 cfm/ft<sup>2</sup> (2.0 L/s•m<sup>2</sup>) for Group R occupancy buildings and 0.22 cfm/ft<sup>2</sup> (1.8 ((2.0)) L/s•m<sup>2</sup>) for all other occupancies** under a pressure differential of 0.3 in. water (75 Pa), with the calculated surface area being the sum of the above and below grade *building envelope*. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the code official and the building owner.

~~**Exception:** Where the conditioned floor area of the building is not less than 250,000 ft<sup>2</sup> (25,000 m<sup>2</sup>), air leakage testing shall be permitted to be conducted on representative above grade sections of the building provided the conditioned floor area of tested areas is no less than 25 percent of the conditioned floor area of the building and are tested in accordance with this section.~~

#### 4. C402.5.7 New vestibule exception for outdoor seating areas.

(Note: This additional exception clarifies that vestibules are not required for doors used only to access outside seating areas.)

**C402.5.7 Vestibules.** All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors. For the purposes of this section, “building entrances” shall include exit-only doors in buildings where separate doors for entering and exiting are provided.

Interior and exterior doors shall have a minimum distance between them of not less than 7 feet. The exterior envelope of conditioned vestibules shall comply with the requirements for a conditioned space. Either the interior or exterior envelope of unconditioned vestibules shall comply with the requirements for a conditioned space. The building lobby is not considered a vestibule.

#### **Exceptions:**

1. (first 10 exceptions unchanged)

11. Doors that are used only to access outdoor seating areas that are separated from adjacent walking areas with a fence or other barrier.

#### 5. C403.2.4.1 Rewording of incomprehensible exception.

(Note: The original exception, edited through a committee process, uses a triple-negative and is very hard to understand. The rewording preserves the original meaning and intent.)

**C403.2.4.1 Thermostatic controls.** The supply of heating and cooling energy to each *zone* shall be controlled by individual thermostatic controls capable of responding to temperature within the *zone*. Controls in the same zone or in neighboring zones connected by openings larger than 10 percent of the floor area of either zone shall not allow for simultaneous heating and cooling. At a minimum, each floor of a building shall be considered as a separate zone. Controls on systems required to have economizers and serving single zones shall have multiple cooling stage capability and activate the economizer when appropriate as the first stage of cooling. See Section C403.3.1 for further economizer requirements. Where humidification or dehumidification or both is provided, at least one humidity control device shall be provided for each humidity control system.

##### **Exceptions:**

1. (exception 1 not changed).
2. ~~Any nonperimeter zones not separated from perimeter zones by an interior wall with openings no larger than 10 percent of the perimeter floor zone area shall have setpoints and deadbands coordinated so that cooling in adjacent zones shall not operate until the adjacent zone temperature is 5°F (2.8°C) higher than the perimeter zone temperature. Where an interior zone is open to a perimeter zone with permanent openings that are larger than 10 percent of the floor area of either zone, cooling in the interior zone is permitted to operate while the perimeter zone is in heating at times when the interior zone temperature is at least 5°F (2.8°C) higher than the perimeter zone temperature.~~

#### 6. C403.2.4.13 New requirement - PICVs at large heating and cooling coils.

(Note: This new requirement was proposed by engineers participating in the public meetings. It applies to medium and large-scale valves, and ensures accurate flow across the valve with optimized Delta-T. These valves have the additional advantage of eliminating the need for system pressure balancing.)

**C403.2.4.13 Pressure Independent Control Valves.** Where design flow rate is 10 GPM or higher in a modulating hydronic system, pressure independent control valves shall be provided at heating water and chilled water coils.

(Little-known fact: The PICV was invented right here in Woodinville 20 years ago.)



## 7. C403.6 Clarification that DOAS rule does not impact accessory occupancies.

(Note: This exception responds to a potential ambiguity in the code about the application of the new DOAS rules to accessory occupancies (occupancies occupying less than 10% of the floor area). Under this exception, an office area in a factory or a retail storefront in a hospital would not have to comply.)

**C403.6 Dedicated outdoor air systems (DOAS).** (This section is **Optional through 6/30/2017**; it becomes **Prescriptive as of 7/1/2017**). For office, retail, education, libraries and fire stations, outdoor air shall be provided to each occupied space by a dedicated outdoor air system (DOAS) which delivers 100 percent outdoor air without requiring operation of the heating and cooling system fans for ventilation air delivery.

### **Exceptions:**

1. Occupied spaces that are not ventilated by a mechanical ventilation system and are only ventilated by a natural ventilation system per Section 402 of the *International Mechanical Code*.
2. High efficiency variable air volume (VAV) systems complying with Section C403.7. This exception shall not be used as a substitution for a DOAS per Section C406.6 or as a modification to the requirements for the Standard Reference Design per Section C407.
3. Spaces that are within building types not covered by Section C403.6 and that qualify as accessory occupancies according to Section 508.2 of the *International Building Code* are not required to comply with this section.

## 8. C404.8 Prohibition of a sub-standard circulating hot water system type.

(Note: This section was inserted in the IECC, and seems to legitimize a wasteful practice of using the cold water distribution piping as the “return” for circulating hot water.)

**C404.8 Demand recirculation controls.** A water distribution system having one or more recirculation pumps that pump water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe ~~((shall))~~ **are not permitted.** ~~((be a demand recirculation water system. Pumps shall have controls that comply with both of the following:~~

- ~~1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sending the flow of hot or tempered water to a fixture fitting or appliance.~~

~~The control shall limit the temperature of the water entering the cold water piping to 104°F (40°C))~~

## 9. C405.2.5 Added new exception to the stairwell light reduction control requirement

(Note: This corrects an error in the current code and allows significant lighting energy savings for egress stairs. Related changes are proposed for the Code Alternate in the building code. Inactivity time is shortened to 15 minutes. Rather than stating the minimum lighting level for the unoccupied state, it now refers back to the building code.)

**C405.2.5 Additional lighting controls.** Specific application lighting shall be provided with controls, in addition to controls required by other sections, for the following:

1. (first 7 exceptions unchanged)
8. Each stairway shall have one or more control devices to automatically reduce lighting power by not less than 50 percent when no occupants have been detected in the stairway for a period not exceeding ~~((30))~~ 15 minutes, and restore lighting to full power when occupants enter the stairway. All portions of stairways shall remain illuminated to meet the requirements of Seattle Building Code Section 1008 or Code Alternate CA1008.2 when the lighting power is reduced.

## 10. Table C405.4.2 Lighting power allowances.

(Note: This proposal reduces lighting power for all spaces (other than healthcare and spaces for the visually impaired) by an additional 10% beginning in January of 2018, 18 months beyond the effective date of the 2015 Washington State code. This will take advantage of ongoing increases in LED efficacy and reductions in LED package costs.)

**TABLE C405.4.2(1)**

### **INTERIOR LIGHTING POWER ALLOWANCES: BUILDING AREA METHOD**

Building Area Type	LPD (w/ft <sup>2</sup> )	LPD (w/ft <sup>2</sup> )
	<u>Before</u> <u>Jan 1 2018</u>	<u>After</u> <u>Jan 1 2018</u>
Automotive facility	0.64	<u>0.58</u>
Convention center	0.81	<u>0.73</u>
Court house	0.81	<u>0.73</u>
Dining: Bar lounge/leisure	0.79	<u>0.71</u>
Dining: Cafeteria/fast food	0.72	<u>0.65</u>
Dining: Family	0.71	<u>0.64</u>
Dormitory	0.46	<u>0.41</u>
Exercise center	0.67	<u>0.60</u>

Fire station	0.54	<u>0.49</u>
Gymnasium	0.75	<u>0.68</u>
Health care clinic	0.70	0.70
Hospital	0.84	0.84
Hotel	0.70	<u>0.63</u>
Library	0.94	<u>0.85</u>
Manufacturing facility	0.89	<u>0.80</u>
Motion picture theater	0.61	<u>0.55</u>
Multifamily	0.41	<u>0.37</u>
Museum	0.80	<u>0.72</u>
Office	0.66	<u>0.59</u>
Parking garage	0.16	<u>0.14</u>
Penitentiary	0.65	<u>0.59</u>
Performing arts theater	1.00	<u>0.90</u>
Police station	0.70	<u>0.63</u>
Post office	0.70	<u>0.63</u>
Religious building	0.80	<u>0.72</u>
Retail	1.01	<u>0.91</u>
School/university	0.70	<u>0.63</u>
Sports arena	0.62	<u>0.56</u>
Town hall	0.71	<u>0.64</u>
Transportation	0.56	<u>0.50</u>
Warehouse	0.40	<u>0.36</u>
Workshop	0.95	<u>0.90</u>

**TABLE C405.4.2(2)**

**INTERIOR LIGHTING POWER ALLOWANCES: SPACE BY SPACE METHOD**

COMMON SPACE-BY-SPACE TYPES <sup>a</sup>	LPD (w/ft <sup>2</sup> )	<u>LPD (w/ft<sup>2</sup>)</u>
	<u>Before</u> <u>Jan 1 2018</u>	<u>After</u> <u>Jan 1 2018</u>
Atrium - First 40 feet in height <sup>c</sup>	0.03 per ft. ht.	0.03 per ft. ht.

Atrium - Above 40 feet in height <sup>e</sup>	0.03 + 0.02 per ft. ht.	0.03 + 0.02 per ft. ht.
Audience/seating area - Permanent		
In an auditorium	0.50	0.45
In a convention center	0.66	0.59
In a gymnasium	0.34	0.31
In an motion picture theater	0.91	0.82
In a penitentiary	0.22	0.20
In an performing arts theater	1.94	1.75
In a religious building	1.22	1.10
In a sports arena	0.34	0.31
Otherwise	0.34	0.31
Banking activity area	0.81	0.73
Breakroom (seeLounge/breakroom)		
Classroom/lecture/training		
In a penitentiary	1.07	0.96
In an performing arts theater	1.00	0.90
Conference/meeting/multipurpose	0.98	0.88
Copy/print room	0.58	0.52
Corridor		
In a facility for the visually impaired (and not used primarily by the staff) <sup>b</sup>	0.74	0.74
In a hospital	0.63	0.63
In a manufacturing facility	0.33	0.30
Otherwise	0.53	0.48
Courtroom	1.38	1.24
Computer room	1.37	1.23

Dining area		
In a penitentiary	0.77	0.69
In a facility for the visually impaired (and not used primarily by the staff) <sup>b</sup>	1.52	1.52
In a bar/lounge or leisure dining	0.86	0.77
In a family dining area	0.71	0.64
Otherwise	0.52	0.47
Electrical/mechanical	0.76	0.68
Emergency vehicle garage	0.45	0.41
Food preparation	0.99	0.89
Guest room	0.38	0.34
Laboratory		
In or as a classrooms	1.02	0.92
Otherwise	1.45	1.31
Laundry/washing area	0.48	0.43
Loading dock, interior	0.38	0.34
Lobby <sup>c</sup>		
In a facility for the visually impaired (and not used primarily by the staff) <sup>b</sup>	1.44	1.44
For an elevator	0.51	0.46
In a hotel	0.85	0.77
In a motion picture theater	0.42	0.38
In a performing arts theater	1.60	1.44
Otherwise	0.72	0.65
Locker room	0.60	0.54
Lounge /breakroom		

In a health care facility	0.74	0.67
Otherwise	0.58	0.52
Office <sup>f</sup>		
Enclosed	0.89	0.80
Open plan	0.78	0.70
Parking area, interior	0.15	0.14
Pharmacy area	0.91	0.82
Restroom		
In a facility for the visually impaired (and not used primarily by the staff) <sup>b</sup>	0.97	0.97
Otherwise	0.78	0.70
Sales area	1.27	1.14
Seating area, general	0.43	0.39
<del>Stairway (See space containing stairway)</del>		
Stairwell	0.55	0.50
Storage room	0.50	0.45
Vehicular maintenance	0.54	0.49
Workshop	1.27	1.14

<b>BUILDING SPECIFIC SPACE-BY-SPACE TYPES<sup>a</sup></b>	<b>LPD (w/ft<sup>2</sup>) Before Jan 1 2018</b>	<b>LPD (w/ft<sup>2</sup>) After Jan 1 2018</b>
Automotive - Service/repair	0.3	0.27
Convention center - Exhibit space	1.77	1.59
Dormitory living quarters	1.93	1.74
Facility for the visually impaired		

In a chapel (and not used primarily by the staff) <sup>b</sup>	0.45	0.45
In a recreation room (and not used primarily by the staff) <sup>b</sup>	0.18	0.18
Fire stations		
Engine rooms	0.58	0.52
Sleeping quarters	0.96	0.86
Gymnasium/fitness center		
In an exercise area	1.33	1.20
In a playing area	1.06	0.95
Health care facility	0.59	0.59
In an exam/treatment room	0.70	0.70
In an imaging room	0.57	0.57
In a medical supply room	1.51	1.51
In a nursery	0.50	0.50
In a nurse's station	0.73	0.73
In an operating room	0.92	0.92
In a patient room	0.50	0.50
In a physical therapy room	0.73	0.73
In a recovery room	0.92	0.92
Library <sup>f</sup>		
In a reading area	0.74	0.67
In the stacks	1.37	1.23
Manufacturing facility		
In a detailed manufacturing area	1.03	0.93
In an equipment room	0.59	0.53
In an extra high bay area	0.84	0.76

(> 50-foot floor-ceiling height)		
In a high bay area	0.98	0.88
(25 - 50-foot floor-ceiling height)		
In a low bay area	0.95	0.86
(< 25-foot floor-ceiling height)		
Museum		
In a general exhibition area	0.84	0.76
In a restoration room	0.82	0.74
Performing arts theater dressing/fitting room	0.32	0.29
Post office—Sorting area	0.75	0.68
Religious building		
In a fellowship hall	0.51	0.46
In a worship pulpit/choir area	1.22	1.10
Retail		
In a dressing/fitting room	0.57	0.51
In a mall concourse	0.88	0.79
Sports arena—Playing area		
For a Class 1 facility	2.41	2.17
For a Class 2 facility	1.54	1.39
For a Class 3 facility	0.96	0.86
For a Class 4 facility	0.58	0.52
Transportation		
In a baggage/carousel area	0.42	0.38
In an airport concourse	0.29	0.26
At a terminal ticket counter	0.64	0.58
Warehouse—Storage area		



For medium to bulky palletized items	0.46	0.41
For smaller, hand-carried items	0.76	0.68

## 11. C405.10 Controlled receptacles.

(Note: This proposal is intended to make use of the controlled receptacles more convenient and intuitive. Split receptacles (with the top half on the controlled circuit) are more convenient and intuitive for occupants than widely separated controlled and non-controlled outlets. The added exception accommodates standard office cubicle design.)

**C405.10 Controlled receptacles.** At least 50 percent of all 125 volt 15- and 20-ampere receptacles installed in private offices, open offices, conference rooms, rooms used primarily for printing and/or copying functions, break rooms, individual workstations and classrooms, including those installed in modular partitions and modular office workstation systems, shall be controlled as required by this section. ~~((In rooms larger than 200 square feet (19 m<sup>2</sup>),))~~ Either split receptacles shall be provided, with the top receptacle(s) controlled, or a controlled receptacle shall be located within ~~((72))~~ 12 inches ~~((4.8))~~ 0.3 m of each uncontrolled receptacle. Controlled receptacles shall be visibly differentiated from standard receptacles using the standard symbol required by the Seattle Electric Code and shall be controlled by one of the following automatic control devices:

1. An occupant sensor that turns receptacle power off when no occupants have been detected for a maximum of 20 minutes.
2. A time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. The control device shall be configured to provide an independent schedule for each portion of the building not to exceed 5,000 square feet (465 m<sup>2</sup>) and not to exceed one full floor. The device shall be capable of being overridden for periods of up to two hours by a timer accessible to occupants. Any individual override switch shall control the controlled receptacles for a maximum area of 5,000 square feet (465 m<sup>2</sup>).

### Exceptions:

1. Receptacles designated for specific equipment requiring 24-hour operation, for building maintenance functions, or for specific safety or security equipment are not required to be controlled by an automatic control device and are not required to be located within ~~((72))~~ 12 inches of a controlled receptacle.

\*

2. Within a single modular office workstation, non-controlled receptacles are permitted to be located more than 12 inches, but not more than 72 inches, from the controlled receptacles serving that workstation.

## 12. C406.5 – additional efficiency credit for renewable energy:

(Note: This proposal clarifies that the renewable energy used to qualify for the on-site renewable credit is in addition to, not in lieu of, the renewable energy required by C411. It sets a much simpler standard for calculation (peak PV watts per SF of conditioned space) than the one in the State code, which requires calculation of the overall annual energy production of the array.)

**C406.5 On-site renewable energy.** In addition to the renewable energy required by Section C411, buildings Buildings shall be provided with on-site renewable energy systems with a total peak system rating per square foot of conditioned floor area of the building of not less than 0.5 Watts (or 1.7 BTU/h) per square foot of conditioned space ((the value specified in Table C406.5)).

**TABLE C406.5**  
**ON-SITE RENEWABLE ENERGY**  
**SYSTEM RATING**  
**(PER SQUARE FOOT)**

<b>Building Area Type</b>	<b>kBTU</b>	<b>kWh</b>
Assembly	1.8	0.53
Dining	10.7	3.14
Hospital	3.6	1.06
Hotel/Motel	2.0	0.59
Multi-family residential	0.50	0.15
Office	0.82	0.24
Other	2.02	0.59
Retail	1.31	0.38
School/University	1.17	0.34
Supermarket	5.0	1.47
Warehouse	0.43	0.13

### 13. C407.2.1 Requires higher levels of efficiency for buildings with large glazing areas

(Note: Building envelopes remains virtually unchanged for generations, while mechanical and lighting systems are more frequently updated. This proposal requires that projects with glazing areas exceeding 45% of wall area must meet a progressively higher overall degree of efficiency.)

**C407.2.1 Cap on vertical fenestration area.** Vertical fenestration area shall not exceed 45 percent of the above-grade wall area.

#### **Exceptions:**

1. This cap shall not apply to projects for which a complete building permit application was submitted prior to January 1, 2018.
2. Vertical fenestration area may exceed 45 percent of the above-grade wall area, where the annual energy consumption of the *proposed design* is 0.33 percent lower than that permitted by the selected option in Section C407.3, for each 1 percent increase in vertical fenestration area above 45 percent.

### 14. C408.3 Clarification that commissioning of controlled receptacles is required.

(Note: This was missed in the editing of the State code.)

**C408.3 ((~~Electrical power~~)) Controlled receptacles and lighting systems commissioning.**  
~~((~~Electrical power~~)) Controlled receptacles and lighting systems subject to Section C405 shall be included in the commissioning process required by Section C408.1. ((~~The commissioning process shall minimally include all energy code requirements for which the code requires specific daylight responsive controls, "control functions," and where the code states that equipment shall be "configured to" perform specific functions.~~))~~ The configuration and function of controlled receptacles and lighting control systems required by this code shall be tested and shall comply with Section C408.3.1.

#### 15. C409.4.3 Metering energy display – revised to clarify characteristics of display format.

(Note: This proposal is intended to ensure that the energy display format is useful for building operators.)

**C409.4.3 Energy display.** For each building subject to Section C409.2 and C409.3, either a readily accessible and visible display, or a web page or other electronic document accessible to building management or to a third-party energy data analysis service shall be provided in the building accessible by building operation and management personnel. The display shall graphically provide the current energy consumption rate for each whole building energy source, plus each end use category, as well as the ~~average total~~ and ~~((peak))~~ maximum hourly consumption values for any day, month, week or year.

The display shall be capable of and configured to graphically display the energy use data for any source or end use category or any combination of sources and end uses for any selected daily, weekly, monthly or annual time period, and to view the selected time period simultaneously with another selected time period or a reference benchmark time period. The display shall be capable of weather-normalizing data in the comparison time periods, and facilitate display of energy use trends and identification of anomalies.

**16. C411.1 Renewable energy – clarification of calculation methodology for exception, and codification of an acceptable alternate path.**

(Note: Clarifies calculation methodology for exception to the solar requirement, and adds an exception for (typically multi-family) buildings with electric resistance heat and envelopes that are significantly better than code. This latter exception is allowed in the current renewable energy TIP.)

**C411.1 On-site renewable energy systems.** Each new building or addition larger than 5,000 square feet of gross conditioned floor area shall include a renewable energy generation system consisting of at least 70 Watts rated peak photovoltaic energy production, or 240 kBtu of annual solar water heating energy production, per 1,000 square feet of conditioned space or fraction thereof. For buildings over 5 stories in height, the conditioned area for this calculation shall be based on the conditioned area of the largest 5 above-grade stories in the building. This system is permitted to be mounted either within the allocated *solar zone* required by Section C412.1, or elsewhere on the building or site.

**Exceptions.**

1. Higher-efficiency mechanical equipment is permitted to be provided in lieu of on-site renewable energy systems, where the capacity-weighted equipment efficiency for the total capacity of the space heating and space cooling equipment is a minimum of 1.10 times the corresponding minimum efficiency in Tables C403.2.3(1) through ~~((C403.2.3(8)))~~ C403.2.3(9) for both part load and full load. For the purposes of this calculation, the efficiency of water-cooled chillers shall be defined as the inverse of the corresponding minimum efficiency listed in Table C403.2.3(7) in units of kW/ton. All factors used in the calculation shall first be converted to like units. The minimum efficiency for this exception shall be in excess of that required elsewhere in the Energy Code, including Section ~~((C403.4.1))~~ C403.3 (economizers). The Standard Reference Design determination from Section C407 shall be used to establish the baseline case for determination of the 1.10 factor.
2. Additional heat recovery systems beyond those required by this code are permitted to be provided in lieu of on-site renewable energy systems, where the calculated net annual energy savings from the heat recovery systems exceed the calculated net annual energy production of the required on-site renewable energy systems. Acceptable heat recovery systems include but are not limited to: exhaust air heat recovery in excess of that required by this code, waste water or sewer heat recovery, ground source heating and cooling, or heat recovered from other on-site or off-site sources that would otherwise be lost into the sewer or atmosphere.
3. Buildings that are primarily served by electric resistance heating, and that are not primarily served by a central HVAC system, are permitted to provide a higher-performing building envelope in lieu of the renewable energy required by Section C410.1. To qualify for this alternative compliance pathway, the building envelope must have a total Design UA value that is at least 15 percent below the Target UA value, using the component performance calculation methodology in Section C402.1.5.

## 17. C412 Solar readiness – extends requirement to 20 stories

(Note: This proposal requires roofs of most buildings, including multi-family, up to 20 stories to be solar-ready. The net area still excludes skylights, planted areas, roof decks and extensive rooftop equipment.)

**C412.1 General.** In addition to the requirements of C411, a *solar zone* shall be provided on multifamily buildings 4 - 20 stories in height above grade plane and non-residential buildings ~~((of any size))~~ that are ~~((five))~~ 20 stories or less in height above grade plane. ~~((and))~~ The *solar zone* shall be located on the roof of the building or on another structure elsewhere on the site. The *solar zone* shall be in accordance with Sections C412.2 through C412.8 and the *International Fire Code*.

## 18. C412.7 & C412.8 Solar readiness – updates to match new State code language

(Note: This updates the Seattle solar-ready provisions to match the language in the new State appendix.)

**C412.7 Structural integrity.** ~~((If the solar zone is on the roof of the building or another structure on the site, the))~~ The as-designed dead load and live load for the *solar zone* shall be clearly marked on the record drawings, and shall accommodate future photovoltaic or solar water heating systems arrays at an assumed dead load of ~~((5))~~ 4 pounds per square foot in addition to other required live and dead loads. For photovoltaics, a location for future inverters shall be designated either within or adjacent to the *solar zone*, with a minimum area of 2 square feet for each 1000 square feet of *solar zone* area, and shall accommodate an assumed dead load of 175 pounds per square foot. Where photovoltaic or solar water heating systems are installed in the solar zone, structural analysis shall be based upon calculated loads, not upon these assumed loads.

**C412.8 Photovoltaic or solar water heating interconnection provisions.** Buildings shall provide for the future interconnection of either photovoltaics in accordance with Section C412.8.1 or solar water heating in accordance with Section C412.8.2.

**C412.8.1 Photovoltaic interconnection.** A capped roof penetration sleeve shall be provided in the vicinity of the future inverter, sized to accommodate the future photovoltaic system conduit. ~~The capped roof penetration shall be sized to accommodate a conductor and conduit for 10 peak watts per square foot of the required solar zone area.~~ Interconnection of the future photovoltaic ~~((or solar water heating))~~ system shall be provided for at the main service panel, either ahead of the service disconnecting means or at the end of the bus opposite the service disconnecting means, in one of the following forms:

- a. A space for the mounting of a future overcurrent device, sized to accommodate the largest standard rated overcurrent device that is less than 20 percent of the bus rating.
- b. Lugs sized to accommodate conductors with an ampacity of at least 20 percent of the bus rating, to enable the mounting of an external overcurrent device for interconnection.

The electrical construction documents shall indicate the following:

- a. *Solar zone* boundaries and access pathways;
- b. Location for future inverters and metering equipment; and
- c. Route for future wiring between the photovoltaic panels and the inverter, and between the inverter and the main service panel.

## 19. C503.2– new exception for adding cooling to small spaces

(Note: This proposal allows air conditioning to be added to small areas without requiring an energy upgrade of the entire building.)

**C503.2 Change in space conditioning.** Any nonconditioned space that is altered to become *conditioned space* or *semi-heated space* shall be required to be brought into full compliance with this code. Any semi-heated space that is altered to become conditioned space, or any heated but not cooled space that is altered to become both heated and cooled, shall be required to be brought into full compliance with this code.

**Exceptions:** 1. Where the component performance building envelope option in Section C401.3 is used to comply with this Section, the Proposed UA is allowed to be up to 110 percent of the Target UA.

2. Where the total building performance option in Section C407 is used to comply with this section, the annual energy consumption of the proposed design is allowed to be 110 percent of the annual energy consumption otherwise allowed by Section C407.3.

3. The addition of air conditioning units serving rooms or spaces totaling less than 2000 square feet in floor area does not trigger the requirement to comply with this section.

## 19A. C503.4 – Rewording of economizer exception

(Note: This proposal reorganizes wording in an exception that has been difficult to comprehend.)

**C503.4 Mechanical systems.** Those parts of systems which are altered or replaced shall comply with Section C403. Additions or alterations shall not be made to an existing mechanical system that will cause the existing mechanical system to become out of compliance.

**Exception:** Existing mechanical systems which are altered or where parts of the system are replaced are not required to be modified to comply with Section C403.6 as long as mechanical cooling is not added to the system.

**C503.4.1** All new systems in existing buildings, including packaged unitary equipment and packaged split systems, shall comply with Section C403.

**C503.4.2** Where mechanical cooling is added to a space that was not previously cooled, the mechanical system shall comply with either Section C403.6 or C403.3.

**Exceptions:**

1. Alternate designs that are not in full compliance with this code may be approved when the code official determines that existing building constraints including, but not limited to, available mechanical space, limitations of the existing structure, or proximity to adjacent air intakes/exhausts make full compliance impractical. Alternate designs shall provide alternate energy savings strategies including, but not limited to, Demand Control Ventilation or increased mechanical cooling or heating efficiency above that required by Tables C403.2.3(1) through C403.2.3(10).

2. Qualifying small equipment: ~~((This exception shall not be used for unitary cooling equipment installed outdoors or in a mechanical room adjacent to the outdoors. This exception is allowed to be used for other))~~ Economizers are not required for cooling units and split systems serving one zone with a total cooling capacity rated in accordance with



Section C403.2.3 of less than 33,000 Btu/h (hereafter referred to as qualifying small systems) provided that these are high-efficiency cooling equipment with SEER and EER values more than 15 percent higher than minimum efficiencies listed in Tables C403.2.3 (1) through (3), in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify for this exception. The total capacity of all qualifying small equipment without economizers shall not exceed 72,000 Btu/h per building, or 5 percent of its air economizer capacity, whichever is greater.

Notes and exclusions for exception 2.

2.1. That portion of the equipment serving residential occupancies is not included in determining the total capacity of all units without economizers in a building.

2.2. Redundant units are not counted in the capacity limitations.

2.3. This exception shall not be used for the shell-and-core permit, for the initial tenant improvement, for Total Building Performance.

2.4 This exception shall not be used for unitary cooling equipment installed outdoors or in a mechanical room adjacent to the outdoors.

3. Chilled water terminal units connected to systems with chilled water generation equipment with IPLV values more than 25 percent higher than minimum part load efficiencies listed in Table C403.2.3(7), in the appropriate size category, using the same test procedures. Equipment shall be listed in the appropriate certification program to qualify for this exception. The total capacity of all systems without economizers shall not exceed ~~((480,000))~~ 72,000 Btu/h (141 kW) per building, or 20 percent of its air economizer capacity, whichever is greater.

Notes and exclusions for exception 3.

2.1. That portion of the equipment serving Group R occupancy is not included in determining the total capacity of all units without economizers in a building.

2.3 This exception shall not be used for the initial permit (this includes any initial permit for the space including, but not limited to, the shell-and-core permit, built-to-suit permit, and tenant improvement permit) or for Total Building Performance Method.

**20. C503.8.3.2 Substantial alterations envelope UxA path, limited to 15% above code (not 20%)**

**21. C503.8.3.2 New disproportionality rule for substantial alterations projects – caps required envelope improvements at 20% of the substantial alterations project building valuation.**

**22. C503.8.3.3 Substantial alterations Total Building Performance path, limited to 10% above code (not 15%)**

(Note: These are three amendments to the substantial alterations rules. The first and third tighten up the standard for compliance based on the UxA tradeoff and energy modeling approaches. This is based on SDCI energy review staff that the current standard is too easy to meet for typical substantial alterations projects that they have reviewed. The second one places a cap on the cost of envelope improvements, proportionate to the project valuation.)

**C503.8.3 Energy Efficiency.** Buildings undergoing substantial alterations shall comply with one of the following:

**1. Full code compliance.** Fully comply with the requirements of this code for new construction.

**2. Envelope thermal performance within ~~20~~ 15 percent of code.** Demonstrate that heat loss through the altered building envelope is no more than ~~20~~ 15 percent greater than allowed by the Seattle Energy Code, using the Component Performance Building Envelope Option in Section C402.1.~~3~~ 5, and meet all other prescriptive requirements of the Seattle Energy Code for new construction.

**2.1. Default U-values.** The values listed in Appendix A and Section C303 shall be used as the default U-values for existing building envelope components. For buildings whose original construction permits were applied for after January 1, 1992, existing building envelope components are deemed to meet the minimum U-values required by the edition of the Seattle Energy Code in effect at the time of permit application, where visual inspection by the *code official* reveals that those components appear to be equal to or better than code-compliant components.

**2.2. Disproportionality.** Where approved by the code official, the cost of required thermal improvements to the building envelope are not required to exceed 20 percent of the valuation of the substantial alterations project, determined in accordance with the Fee Subtitle, when using this envelope thermal performance compliance method. Costs shall be documented by an independent professional cost estimator.

**3. Total building performance within ~~15~~ 10 percent of code.** Demonstrate that the building energy consumption will be less than ~~((108))~~ 10 percent higher than that of the standard reference design (SRD) using the Total Building Performance methodology in Section C407 of the Seattle Energy Code, as follows.

**1. less than 97 percent of SRD when no C406 options are included in the SRD**

**2. less than 100 percent of SRD when one C406 option is included in the SRD**

**3. less than 103 percent of SRD when two C406 options are included in the SRD**

## 23. Clarification of metering requirements for additions to small buildings

(Note: This revision re-words a metering requirement that has been difficult to understand.)

**C506.1.1 Small existing buildings.** ~~For existing buildings that were constructed subject to the requirements of this code, but were exempt from the requirements of Section C409 due to being smaller than the thresholds set forth in Section C409.1, In buildings that were constructed subject to Section C409, metering and data acquisition systems shall be provided for additions over ((25,000)) 10,000 square feet in accordance with the requirements of sections C409.2, ((and)) C409.3 and C409.4.~~

## 24. Metering of large replacement equipment in existing buildings

(Note: Adds requirement for major new HVAC equipment in existing buildings to be metered, with at least a local readout.)

**C506.2 Metering for the addition or replacement of HVAC equipment in existing buildings.** Where HVAC equipment is added or replaced, metering shall be provided according to Sections C506.2.1 or C506.2.2, as applicable.

**C506.2.1 Addition or replacement of individual HVAC equipment pieces.** Where HVAC equipment is added or replaced, but compliance with Section C506.2.2 is not required, metering shall be provided as follows, and the data from these meters is permitted to either be stored locally using a manual totalizing meter or other means at the meter or fed into a central data collection system.

1. Electrical metering shall be provided for all of the following:
  - a. Each new or existing branch circuit serving a new piece of HVAC equipment with minimum circuit ampacity (MCA) that equates to 50 kVA or more. A single meter is permitted to serve multiple circuits of the same sub-metering category from Section C409.3.
  - b. Each new or existing branch circuit supplied by a new electrical panel that is dedicated to serving HVAC equipment. It shall be permitted to meter the circuits individually or in aggregate.
  - c. Each new HVAC fan or pump on a variable speed drive, where the fan, pump, or variable speed drive are new, unless the variable speed drive is integral to a packaged HVAC unit or the existing variable speed drive does not have the capability to provide electric metering output.
2. Natural gas metering shall be provided for each new natural gas connection that is rated at 1,000 kBtu's or higher. A single meter is permitted to serve multiple equipment pieces of the same sub-metering category from Section C409.3; HVAC, water heating or process.

**C506.2.2 Addition or replacement of the majority of HVAC equipment in a building.** Where permits are issued for new or replacement HVAC equipment that has a total heating and cooling capacity greater than 1,200 kBtu/hour and greater than 50 percent of the building's existing HVAC heating and cooling capacity, within any 12-month period, the following shall be provided for the building: (remainder of section unchanged)